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Pre-prepackaging Pears And Apples

By Fisk Gerhardt

Transparent plastic films such as Pliofilm, polyethylene, and cellophane have demonstrated their value in the prepackaging of fresh fruits and vegetables. In fact, in many instances, these materials have made the prepackaging of certain products possible. Now, some of these same transparent films have proved their worth in what might be described as the "pre-prepackaging" of certain fruits.

Studies made by the U. S. Department of Agriculture over the past several years have demonstrated that certain sealed film box liners for fall and winter pears and Golden Delicious apples not only substantially lengthen the cold-storage life and maintain the quality of these fruits, but also extend their "shelf-life" after removal from refrigerated storage.

Use of transparent film for packaging boxes of pears and apples destined for prolonged cold storage is not as simple as the prepackaging of fruits and vegetables for retail sale, however. Only a few of the various types of Pliofilm, polyethene, and cellophane are suitable. When these are used as sealed box liners, the work has to be done carefully. Some types of film have to be perforated as soon as the boxed fruit is removed from cold storage and all of them should be opened before the fruit is shipped for retail sale. In addition, only sound fruit, treated with fungicide, and handled with care, should be stored in sealed film box liners.

Background

All commercial varieties of fall and winter pears produced in the Pacific Northwest - Bartlett, Comice, Anjou, and Bosc - lose their capacity to ripen normally after rather definite periods of storage at 31 degrees Fahrenheit. During extended storage they also lose moisture and at relative humidities under 90 percent they eventually shrivel and lose their fresh appearance. Methods of packaging the fruit to extend its storage life and preserve its appearance and dessert quality were needed to successfully market the increasing tonnange of the fruit which was being produced in the Pacific Northwest Area.

For the past five years, research personnel of what is now the Biological Sciences Branch of the Agricultural Marketing Service have been developing information on the packaging of pears and apples in various kinds of sealed plastic films before placing them in storage. Special attention was given to the influence of the films on storage condition, ripening capacity, dessert quality, and the physiology of the stored fruits.

The studies developed evidence demonstrating that the appearance, storage life and dessert quality of fall and winter pears and Golden Delicious apples can be improved by packing the fruit in certain kinds of sealed film box liners.

The types of films which may be safely used as sealed liners during storage at 31 degrees F. are: Pliofilms 75 FF, 80 and 100 FM1, 80 and 100 HP; cellophane 300 LSAT; and polyethylene 100 and 150. To avoid injury to the fruit when such films as Pliofilm 75 FF, 80 and 100 HP and cellophane 300 LSAT are used, the film liners should be perforated immediately upon removal of the boxed fruit from cold storage.

Commercial pear pack in film liner showing method of closure by twist seal.

Fold-over of plastic film liner in commercial pack of Golden Delicious apples in cell-type carton prior to sealing. Colored foil wraps are used to decorate top layer of fruit.

The other Pliofilms and polyethylene films cited possess sufficient permeability to respiratory gasses to permit safe handling of the fruit at room temperature for at least 4 days after removal from cold storage without perforating the sealed liner. All sealed film box liners for packaged pears and apples should be perforated at shipping point before entering into unsupervised handling at retail.

Certain types of transparent films - those with limited rates of gaseous diffusion - can cause severe injury or "off" flavor to packaged fruit when used as sealed film box liners, even at 31 degrees F. storage. The damage is done by the accumulation of carbon dioxide being held within the liner and the failure of the film to admit sufficient oxygen to support normal respiration of the fruit. For this reason, films such as cellophane 300 and 45 MSAT, and Pliofilms 120 P4 and 120 P6 should not be used as sealed box liners without suitable perforations.

During the research gas concentrations of 1 to 5 percent carbon dioxide and 10 to 18 percent oxygen were found in boxes of pears and apples at 31 degrees F. storage when the various kinds of the recommended sealed film box liners were used.

Physiological changes in pears, generally associated with progressive ripening of the fruit in cold storage, were definitely retarded by the use of sealed film liners. The "shelf-life" of the fruit when ripened was generally increased several days by use of this packing procedure. Pears in these sealed films possessed a fresher appearance, a greater freedom from shrivel, and cold storage life (with normal ripening capacity) of 6 to 8 weeks longer than comparable fruit packed without protection of the sealed film.

Apple Shriveling Reduced

While biochemical tests did not always reflect the benefit of sealed film box liners for Golden Delicious apples, visual and taste examinations and a check on weight loss of the fruit during storage did show the value of this method of packing. Visible shriveling of these apples occurs when they lose approximately 3 to 5 percent of their original weight during storage. Without the protection of sealed film box liners such a condition existed in all Golden Delicious apples, both in cartons and wooden boxes when stored for extended periods - past January of each marketing year. The greatest protection against shrivel in stored apples was provided by polyethylene film.

When polyethylene 150 and Pliofilms 80 FM1 and 80 HP were used for sealed box liners for apples, the fruit, even after prolonged storage, had a fresh look, a firm feel to hand pressure, and a delicate aromatic flavor characteristic of the variety when sampled early in its storage life.

Liners Must Be Used Carefully

Certain precautions must be taken when pears and apples are packed in sealed film liners. Every effort should be made to use fruit free from surface abrasions and potential fungi infection; it should be washed with an effective fungicide and handled carefully to minimize bruising, as moisture conditions within the sealed package are conducive to the development of decay. Care should be excercised in handling and in closing the film box liner to assure a perfect seal. Even a small tear will prevent the accumulation of a necessary amount of carbon dioxide in the package.

Trade Acceptance Excellent

Commercial use of sealed film box liners for storage packing pears and Golden Delicious Apples has increased considerably, and trade acceptance of fruit packed in this manner has been excellent. Terminal market handlers have been particularly impressed with the fresh appearance and uniformity of excellent color development of such fruit when it has ripened. As one of them said:

"It would be wonderful if all winter pears were packed this way throughout the season. These look as if they were picked only yesterday."

The work on sealed film box liners reported in this article was done at the research laboratory of the U.S. Department of Agriculture at Wenatchee, Washington.

Egg Marketing Margins

By Robert M. Conlogue

What are the costs of marketing eggs? Who receives the difference between what producers are paid for their eggs and what city consumers pay for them.

These and other questions are being answered for at least one large city market--Washington, D. C.--in a study now under way in the Agricultural Marketing Service, U. S. Department of Agriculture. The study covers the total spread between prices paid to producers and prices paid by consumers for eggs entering the Washington, D. C., market. The marketing margins are those received by country egg assemblers (including transportation costs), margins received by primary receivers (wholesalers in the District of Columbia market), and retailers' "mark-ups."

In November 1953, the total marketing margin on eggs from the time they left the farm until they were sold to consumers in Washington, D. C., ranged from 27½ cents to 30½ cents a dozen. Of this total, country assemblers typically received about 7 cents a dozen; primary receivers (wholesalers) got 10 cents; and large retailers, 10½ cents. Small retailers took 13½ cents a dozen for their services.

Eggs coming into the Nation's Capital were largely from flocks in concentrated producing areas in Pennsylvania, New Jersey, Maryland, and Virginia, and in Minnesota and Iowa. Total costs of marketing eggs varied considerably, depending upon distance of production area from the market, handling techniques, the weather, quality losses, and other factors. A breakdown of these costs follows:

Country Assemblers' Margins

For eggs marketed in Washington which came from nearby States, country assemblers received a gross margin of about 7 cents a dozen. This 7 cents included about 1 cent per dozen for pickup at farms; cases, flats, and fillers, about 1-3/4 cents; transportation, 1-¼ cents; plant labor, other operating expenses, and profit, about 3 cents.

Prices paid midwestern producers for eggs shipped to the Washington market in November 1953 were 5½ cents lower than prices paid to producers in nearby States. Most of this difference can be accounted for by transportation costs, which amount to 3 to 3½ cents per dozen from the Midwest, and by the loss in grade caused mainly by the long haul and additional time it takes to move eggs from midwestern producers to eastern consumers. The eggs are candled and generally graded after reaching eastern markets. The loss in grade is estimated equivalent to about 2 cents per dozen on

the average. Other direct costs to midwestern country assemblers, on the basis of preliminary findings, were similar to those encountered by eastern assemblers. These were: Pickup at farms, 1 to 1½ cents a dozen; cases, flats and fillers, 2 cents; plant labor, 1-2/10 to 1-8/10 cents a dozen; and other operating costs, ½ to 1½ cents.

City Wholesalers' Margins

Primary receivers (wholesale handlers) in Washington, D. C., got a gross margin of 10 cents per dozen for eggs during the November 1953 period. The operating costs of these handlers were the same whether the eggs came from nearby States or the Midwest. Typical costs for this group of handlers are approximately 1½ to 3 cents a dozen for labor and candling; 3 cents for cartons; 2 cents for breakage, spoilage, and grade loss; and about 1 to 1½ cents for plant overhead and other expenses.

Retailers' Margins

Large retailers purchasing eggs from Washington, D. C. wholesalers received a gross margin of 10½ cents per dozen, and small retailers purchasing from wholesalers and others (principally hucksters) had a gross margin of 13½ cents per dozen. Information on the costs of handling eggs at the retail level were not obtained since many of the services provided by retailers are common to all commodities in the store. Gross percentage margins on eggs, however, approximate average margins on all products combined sold by retail food stores in the Washington, D. C., area.

Seasonal Change in Margin

Preliminary data for February 1954, when compared with the November 1953 study, show a narrowing of the total spread between producers and consumers of about 3½ cents per dozen. This can be partly accounted for by heavier egg production, which resulted in a greater volume marketed with a consequent reduction of costs. In general, eggs coming to the Washington market in February are of somewhat better average quality than eggs coming to market in November, depending upon the weather and other factors. This makes it possible for distributors to lower their margins somewhat in February since overall costs of handling are less when a smaller percentage of undergrade eggs are being received.

Handling Methods Improve Quality

The study revealed that eggs marketed in Washington usually were purchased by country assemblers, both in nearby States and the Midwest, on the basis of size and expected "grade-out." In many instances the producer's name or a code was attached to the case in which nearby eggs were shipped to Washington. When the eggs were candled by the wholesaler, a record was kept of the grade-out -- the number of grade "A" large, grade "A" medium, grade "A" small, "B's," "C's," "checks," and "leakers." If the record on a particular case showed that the "undergrades" it contained were more than would normally be expected, a report of this was forwarded to the country assembler. The assembler then contacted the producer and informed him that his eggs were under the expected grade and

advised him to correct the situation on his next shipment. This type of check, or a variation of it has been successful in encouraging producers to follow production practices which provide country assemblers a high proportion of top-quality eggs.

Where such a practice was not followed, eggs often were purchased by country assemblers, small stores, and others as current receipts. Buyers purchasing eggs this way with no later followup on production practices affecting quality, have experienced poor yields and therefore tended to pay producers less for their eggs.

It was quite noticeable during the preliminary study that top-quality eggs which had been purchased on a "producer-check" basis graded out much better and yielded producers a greater return than eggs coming into the Washington market from areas where there was no check on the producer.

Selling "On Grade" Pays

Producers who sold eggs on a graded basis to dealers supplying the Washington market received prices which were above average for sales in regular wholesale channels. It was evident that they had followed production practices which are conducive to the maintenance of quality, since other producers in the same production areas who failed to maintain quality were forced to sell on a current receipts basis.

As handlers pointed out, it costs as much to pick up "undergrade" eggs at farms and transport them to consuming areas as it does to pick up and transport grade "A" eggs. In addition, replacement costs for the "undergrades" increase in proportion to the number of them that come into consuming areas. "Undergrades" must be sold for a relatively low price compared with the price paid for them.

Results of the study so far clearly indicate that it is profitable for producers to follow production methods which result in shipment of top quality eggs and to choose outlets which will pay according to the quality of eggs delivered. When a greater proportion of quality eggs are sent to market, producers receive better returns, handlers may reduce their costs because of the lower number of undergrade handled, and consumers benefit by a lower price.

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FARM TO LIVE...LIVE TO FARM

President Eisenhower has proclaimed the week beginning July 25, 1954, as National Farm Safety Week. The National Safety Council and USDA are again sponsoring National Farm Safety Week in cooperation with State and local groups, farm organizations, farm press and radio, trade and other associations and many others interested in agriculture. The concerted action of all of these groups during the past 11 years has done much to affect a substantial reduction in farm injuries.

Windows Are Important

By L. B. Darrah and K. S. Carpenter

Housewives are interested in what's inside an egg carton before they purchase it. Quite a few of them handle the closed type of cartons now in use - turning them on end or prying open the cover to inspect their contents - before they make a selection in retail food stores.

This trait - probably more a good buying habit than just feminine curiosity - considered in connection with advances in use of transparent containers for other food products indicated that egg cartons with windows in the top might be practical and probably would increase egg sales.

Research personnel of Cornell University and the Agricultural Marketing Service, USDA, designed window type egg cartons, providing more open space in the cover than cartons currently in use, and tested them for effect on sales in supermarkets in New York State.

Preliminary results indicated that the window type cartons have a favorable effect on egg sales and those with the largest window space in the top of the carton gave the greatest increase in egg sales.

Egg Cartons Do Many Things

Egg cartons are used for several reasons: They protect eggs in the marketing process; make it easy for the customer to purchase and handle eggs since picking up a carton of eggs from a display is a simple matter, and little attention has to be given to handling methods between the display and the home. Another use for cartons is to separate the eggs into desirable units of sale.

Egg cartons also can aid in establishing a brand name. Although few retailers seem to realize it, the eggs they handle can have a distinctive brand name and become a specialty item for the retailer.

Perhaps one of the most important reasons for using an egg carton is to improve the appearance of and stimulate interest in the product. Many people marketing eggs have attempted to do this through a carton design embodying a glorified selection of colors, figures, and printing-- but still the housewife has to turn the typical egg carton on its end or pry open the cover to inspect the eggs.

Evidence that the customer is interested in the contents of a carton of eggs was obtained during three egg merchandising studies in Central New York State. In all three studies over 50 percent of the customers who were purchasing eggs hesitated before selecting the package they were go-

ing to buy. Nearly one-fifth of the customers, 18 percent, handled the cartons-- comparing weights, feeling the tops, viewing the eggs through the end of the cartons or opening the cartons in making their choice.

These observations, coupled with the trend in recent years towards the use of transparent containers and packages for many other products, indicated that egg sales might be increased if customers were able to view the contents of an egg carton.

To determine if this might be true, three types of cartons with relatively large windows were designed for experimental testing in retail stores. One type of carton had six small windows which accounted for about 25 percent of the top cover area (table 1). The second had three medium-size windows occupying nearly 40 per cent of the carton cover, while in a third type approximately one-half of the top cover was used for two large windows.

The average of four types of windowed cartons currently in use shows that about 11 percent of the top cover area is devoted to windows. Thus, the experimental cartons developed for the study had considerably more window space than any cartons in current usage.

Table 1. PROPORTION OF TOP COVER USED FOR WINDOWS IN VARIOUS TYPES OF CARTONS

Type of carton	Proportion of cover used for windows
	Per cent
Average of 4 types of windowed cartons currently in use	11
Cartons Used in the Study:	
(1) Six small windows	25
(2) Three medium-sized windows	40
(3) Two large windows	50

The three types of windowed cartons and the regular non-windowed cartons used in the study are shown in the chart on page 11. Before offering eggs for sale in these cartons, each carton was inscribed with the same brand name, color of egg, size, and grade markings. For better egg protection and to improve the attractiveness of the package, the windows in the experimental cartons were covered with cellophane.

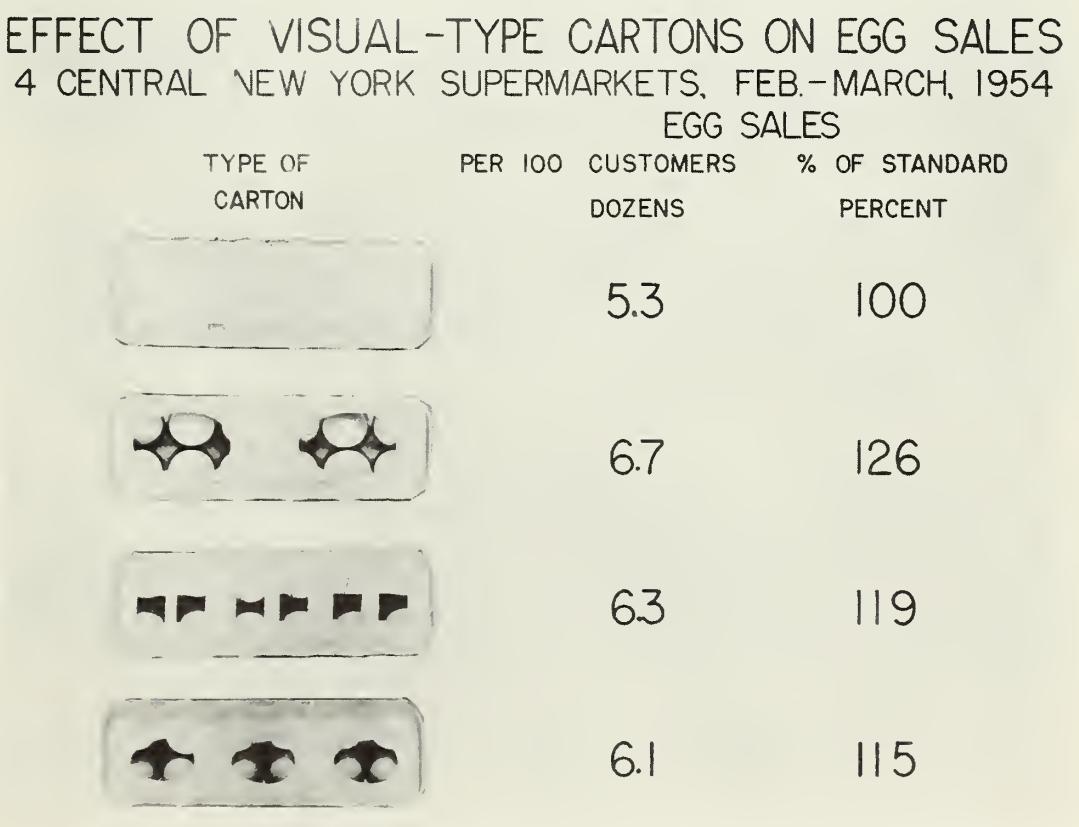
The experimental cartons were tested for consumer acceptance in a supermarket in each of four Central New York cities during February 1954. This study, known as a "latin square test" permitted the four types of cartons to be offered for sale in the four different markets during four separate time periods. This type of test was selected because it minimized the effects on egg sales of variables other than the type of carton. In the study, each week was divided into two time periods, Monday through Thursday being used as one time period and Friday and Saturday serving as the other. With this design, it was possible to complete the test in two weeks and the experiment, with one replication, in a month.

The results of the experiment are shown in Table 2. The regular non-windowed cartons were used as a base with sales per 100 customers of 5.3 dozens. With the three-windowed carton, sales averaged 6.1 dozen or 15 percent more than for the regular non-windowed carton. With the six-windowed carton, sales averaged 6.3 dozen or 19 percent above the regular carton. Highest sales were obtained with the two-windowed carton (where half of the cover was devoted to windows)--6.7 dozen, or 26 percent above the standard carton used.

Table 2. EFFECT OF WINDOWED CARTONS ON EGG SALES
4 Central New York Supermarkets, February 1954

Type of carton	Egg sales per store per week	Egg sales per 100 customers	
		Dozen	Per cent of standard*
	Dozen		
Regular (no windows)	161	5.3	100
Three windows	178	6.1	115
Six windows	191	6.3	119
Two windows	189	6.7	126

* Sales of eggs in regular type carton used as Standard.



Note: The egg cartons shown in this chart are the actual types used in the experiment described in the article. Only the labeling has been removed.

These data, while based on one experiment, need further testing before conclusive statements can be made concerning the relative value of different-sized windows in cartons. Nevertheless, the evidence strongly suggests that the window-type cartons do favorably affect egg sales with greatest sales per 100 customers occurring with cartons having the greatest space devoted to windows.

Grape Storage Losses Cut

Substantial savings from the reduction of storage losses in California table grapes are indicated by results of two separate, but related, research projects conducted by the Biological Sciences Branch, Agricultural Marketing Service, USDA. One is a finding that the major source of decay in stored grapes can be reduced by field applications of fungicides, used as an adjunct to usual fumigation of the grapes in storage. The other is a method of forecasting the amount of decay that will develop in grapes during storage.

California table grapes usually are harvested in October and November. Most of the crop - 5 to 6 million lugs of 28 pounds each, in recent years - goes into cold storage and is marketed during the winter and spring months. Grapes going into storage are fumigated with sulfur dioxide immediately after packing and at intervals during cold storage. While this fumigation will kill fungus spores on the surface of grapes and will inhibit the spread of decay through contact during storage, it does not kill fungus mycelium which already has invaded the tissue of the grapes. Much decay which occurs in storage is due largely to incipient field infections not detectable at harvest, but which can be prevented by applying an appropriate fungicide in the field.

Tests over the past three years, have shown that use of certain fungicides on growing grapes as an adjunct to post-harvest fumigation significantly reduced decay in stored Emperor grapes. These chemicals are Captan (N-trichloromethylmercapto-4-cyclohexene-1,2-dicarboximide), B-622 (2,4-dichloro-6-(O-chloroanilino)-S-triazine) and Crag 5400 (Alpha, alpha-trithiobis-(N-dimethyl thioformamide).

Decay in experimental lots of stored grapes has been successfully forecast in studies over the past two years by measuring the incipient infections in grapes at time of harvest. Representative samples of each lot of grapes were collected immediately before storage, fumigated with sulfur dioxide to destroy surface infection and incubated under aseptic, moist conditions at room temperatures for 10 days. The amount of decay which developed under these conditions indicates the amount that will develop in several months at lower storage temperatures.

Such a forecast should be of great economic value since knowledge of the potential decay makes it possible to market poor-keeping grapes before serious losses occur and hold for longer storage those grapes with better keeping qualities.

Oilseed Processing Trends

By George Kromer

Within each of the major oilseed processing industries two shifts in structure and operation have been significant and continual since World War II. One has been a decrease in number of mills, with an accompanying increase in average mill size. The other has been an increase in oil yield, resulting from the building of new mills of more efficient types-screw press and chemical solvent extraction - and a large number of mills converted to these processes. At the request of USDA, the Bureau of the Census has made periodical surveys since 1945 of soybean, cottonseed and flaxseed processing plants for quantities of seed processed and oil produced, by method of extraction.

Changes that the surveys have disclosed are of such importance in planning new mills and mill locations, remodeling mills, operating and merchandising methods and practices, farm and commercial storage, transportation, and Government programs, that requests for the information far precede the summarization and publication of the information collected.

The purpose of this report is to present the findings of the 1952-53 survey, showing the problems of the oilseed industries and their efforts to adjust to shifting crop areas, improved processing techniques, and the resultant over-capacity and close competition.

The industry expanded facilities rapidly after World War II in response to expanded acreages and oilseed supplies and to relatively high prices for fats and oils and oilseed meals. In the more recent years fats-and-oils prices have been far below their post-war highs, and processors' margins have narrowed. Nevertheless, the processor has had to compete strongly for sufficient seed to utilize his full capacity for operating efficiently and lower unit cost.

Soybeans

The domestic soybean processing industry has continued to shift to the more efficient solvent extraction method. While in 1945-46 this method represented only 28 percent of all soybeans processed, it accounted for 86 percent in 1952-53. Conversely a decrease in the quantity processed by the screw press during this period has resulted in only 13 percent being handled by this method in 1952-53. Almost all of this change took place in the eight central soybean States - Illinois, Iowa, Ohio, Indiana, Minnesota, Missouri, Kansas, and Nebraska - where about 90 percent of the soybeans are processed. The hydraulic press method, gradually fading out for soybean processing, accounted for less than 1 percent of the total processed in 1952-53 and was restricted to mills in the Cotton Belt.

Significant changes are also taking place in number and size of soybean oil mills. In 1951-52, 193 mills processed soybeans in the United States as compared with only 174 in 1952-53. Solvent extraction mills increased in number from the earlier year--70-76--and all this increase was in States outside the Soybean Belt. Furthermore, the solvent mills increased in size, as measured by the average quantity processed per mill. Screw press mills dropped in number from 92 in 1951-52 to 79 in 1952-53. Three-fourths of the mills which disappeared were located in the 8 central soybean States. Hydraulic mills processing soybeans dropped from 31 in the earlier season to only 19 in 1952-53. This decrease represents about a 40 percent decline in hydraulic mills.

Oil yield per bushel of soybeans processed, for the industry as a whole, increased from 10.00 in 1951-52 to 10.82 pounds in 1952-53. Both the solvent extraction and screw press methods increased oil outturns slightly more than a half pound while the hydraulic press method decreased outturns. Solvent extraction processors recovered on the average 11.11 pounds of oil per bushel, or two pounds more oil than the screw press processors and three pounds more oil than the hydraulic processors.

Among the individual States, Illinois had the highest oil outturn, 11.20 pounds, and Indiana ranked second with 11.00 pounds. The eight central soybean States averaged nearly a pound more oil recovery than the other soybean States (table 1, page 16).

In the 1952-53 season, the 76 solvent extraction mills represented about 44 percent of the soybean mills in the industry but accounted for 86 percent, or 201 million bushels, of the 234 million processed. Furthermore, because of superior recovery rate, the solvent extraction method produced 88 percent of the crude soybean oil in the United States.

Cottonseed

The cottonseed processing industry is also continuing its trend toward more efficient extraction methods--more solvent and screw press operations and fewer hydraulic presses. The direct- and prepress-solvent extraction methods together accounted for about 21 percent of the 5.5 million tons processed during 1952-53, compared with only 11.5 percent in 1951-52. A simultaneous decrease from 57 percent to 46 percent took place in the hydraulic press method. While the hydraulic method remains the most important single process, this is the first time in industry history that this method has accounted for less than half of the total crush.

During the 1952-53 season, 303 cottonseed oil mills operated in comparison with 328 in 1951-52. (The 1952-53 figures do not include 8 mills which delint, hull, and ship the cottonseed meats to a central solvent plant.) The decrease represents a sharp drop in the number of hydraulic mills. The screw press and solvent extraction mills each increased by 5. The distribution of mills by method of extraction in 1952-53 was as follows: Hydraulic press, 205; screw press, 80; direct-solvent extraction, 10; and prepress-solvent extraction, 8 (table 2, page 16).

Oil yield per ton averaged 328 pounds in 1952-53, an increase of 8

pounds over 1951-52. Average oil recovery by the different methods was: Prepress-solvent, 380 pounds; direct-solvent, 358 pounds, screw press, 327 pounds; and hydraulic press, 310 pounds (table 3, page 17). The greatest increase in oil outturn was attained by the solvent extraction methods. The prepress-solvent method extracted 12 pounds more oil and direct-solvent 10 pounds more oil in 1952-53 than in the previous year.

Flaxseed

The flaxseed processing industry is apparently the most stable one of the three considered here insofar as quantities processed by method of extraction and oil outturn are concerned. Of the 25 million bushels processed during the 1952-53 season, 53.5 percent was by the screw press method in comparison with 52.6 percent in 1951-52 (table 4, page 17). The remainder in both years was processed primarily by the prepress-solvent method. Regarding linseed oil outturn per bushel for the industry as a whole, it was 20.3 pounds in 1951-52 and 20.1 pounds in 1952-53.

The most important change in the flaxseed processing industry appears to be the decline in number of linseed oil mills from 23 in 1951-52 to 18 in 1952-53. All seven mills that went out were screw press type.

* * *

Soybeans: Quantities processed, by method of extraction, 1945-46 to 1952-53 and oil yield per bushel 1947-48 to 1952-53 1/

Soybeans processed

Oct. 1 - Sept. 30 crop year	Screw press process		Solvent extraction		Hydraulic press process		Total
	1,000 bushels	Percent of total	1,000 bushels	Percent of total	1,000 bushels	Percent of total	1,000 bushels
1945-46.....	102,442	64.2	44,907	28.2	12,111	7.6	159,460
1946-47.....	108,744	63.9	45,224	26.6	16,271	9.5	170,239
1947-48.....	88,233	54.4	61,000	37.6	12,933	8.0	162,166
1948-49.....	101,535	55.3	72,773	39.6	9,351	5.1	183,659
1949-50.....	80,546	41.2	109,258	55.9	5,729	2.9	195,533
1951-52.....	60,440	24.9	178,922	73.7	3,480	1.4	242,842
1952-53.....	31,096	13.3	200,702	85.8	2,082	.9	233,880

Oil yield per bushel

Crop year	Pounds	Pounds	Pounds	Pounds (average for crop)
1947-48.....	8.86	10.67	8.46	9.51
1948-49.....	9.16	10.94	8.67	9.84
1949-50.....	8.96	10.73	8.38	9.93
1951-52.....	8.57	10.52	8.39	10.00
1952-53.....	9.11	11.11	8.11	10.82

1/ Data for 1950-51 not available.

SOURCE: Special survey by Bureau of the Census and U. S. Dept. of Agr.

Table 1.--Soybeans: Number of mills, quantities processed, and oil yield, by method of extraction, United States, by states, 1952-53 1/

State	Screw press			Solvent extraction			Total		
	Mills 2/	Quantity processed	Oil yield per bushel	Mills 2/	Quantity processed	Oil yield per bushel	Mills	Quantity processed	Oil yield per bushel
	Number	1,000 bu.	Pounds	Number	1,000 bu.	Pounds	Number	1,000 bu.	Pounds
United States	79	31,096	9.11	76	200,702	11.11	3/174	3/233,880	10.82
Central soybean producing States:									
Illinois	13	8,657	9.33	16	32,526	11.39	29	91,183	11.20
Iowa	14	7,383	9.20	12	32,736	11.09	26	40,119	10.75
Ohio	7	1,538	8.89	6	24,739	10.85	13	26,277	10.73
Indiana	5	856	9.18	4	25,696	11.06	9	26,552	11.00
Minnesota	3	1,837	8.10	4	9,858	10.25	7	11,695	9.91
Missouri	3	4/	9.42	4	4/	10.80	7	6,490	10.50
Kansas	2	4/	3/	2	4/	3/	4	4,236	10.69
Nebraska	3	1,884	9.61	--	---	---	3	1,884	9.61
Total	50	24,706	9.18	46	183,730	11.14	98	208,436	10.91
Other soybean producing States	29	6,390	8.84	28	16,972	10.78	3/ 76	3/ 25,444	10.08

1/ October 1, 1952 to September 30, 1953.
2/ Mills classified by their major type of process.
3/ The discrepancy between total and the detailed columns is due to 19 hydraulic press mills, in the Cotton Belt, that processed 2,082 bushels of soybeans averaging 8.11 pounds of oil per bushel.
4/ Not shown to avoid disclosure of individual processors' operations.

SOURCE: Special survey by Bureau of Census and U. S. Dept. of Agr.

Table 2.--Cottonseed: Number of mills, quantities processed, and oil yield, by method of extraction, United States, by regions and states, 1952-53 1/

Region and State	Hydraulic press			Screw press			Total 3/		
	Mills 2/	Quantity processed	Oil yield per ton	Mills 2/	Quantity processed	Oil yield per ton	Mills	Quantity processed	Oil yield per ton
	No.	Tons	Pounds	No.	Tons	Pounds	No.	Tons	Pounds
United States	205	2,509,280	310	80	1,798,366	327	303	5,459,000	328
Southeast									
Alabama-Georgia	49	500,511	300	3	4/	4/	54	622,417	305
North Carolina	22	202,394	319	3	8,747	314	25	211,141	318
South Carolina	19	172,622	310	4	18,722	305	23	191,344	309
Area total	90	875,527	306	10	4/	4/	102	1,024,902	309
Valley									
Arkansas-Tennessee	21	480,346	319	6	122,107	329	31	825,628	332
Louisiana-Mississippi	45	646,090	320	5	106,053	328	53	371,069	327
Area total	66	1,126,436	319	11	228,160	328	84	1,696,697	329
Southwest									
Arizona-California	2	4/	4/	13	765,715	336	18	1,056,263	343
Oklahoma-Texas	44	378,633	283	41	631,617	318	91	1,515,747	329
Area total	46	4/	4/	54	1,397,332	328	109	2,572,010	335
All other (Florida, Illinois, Missouri and New Mexico)	3	4/	4/	5	4/	4/	8	165,391	344

1/ August 1, 1952 to July 31, 1953.
2/ Mills classified by their major type of process.
3/ The discrepancy between total and the detailed columns is due to 18 solvent extraction mills. Ten direct-solvent mills processed 512,439 tons, averaging 358 pounds of oil. Eight prepress-solvent mills processed 638,915 tons, averaging 380 pounds of oil.
4/ Not shown to avoid disclosure of individual processors' operations.

SOURCE: Special survey by Bureau of Census and U. S. Dept. of Agr.

Table 3.--Yield of crude cottonseed oil per ton of cottonseed, by method of extraction, United States, by regions and states, 1952-53 season 1/

Region and State	Hydraulic press	Screw press	Direct solvent extraction	Prepress solvent extraction	Total
	Pounds	Pounds	Pounds	Pounds	Pounds
United States	310	327	358	380	328
Southeast	306	311	2/	---	309
Alabama	299	2/	2/	---	304
Georgia	300	2/	2/	---	306
North Carolina	319	314	---	---	318
South Carolina	310	305	---	---	309
Valley	319	328	361	367	329
Arkansas	319	2/	2/	2/	327
Louisiana	310	---	---	2/	320
Mississippi	323	328	2/	2/	329
Tennessee	319	330	2/	---	336
Southwest	285	328	360	382	335
Arizona	2/	344	---	2/	354
California	2/	334	---	2/	338
Oklahoma	2/	301	---	---	300
Texas	283	320	360	2/	330

1/ August 1, 1952 through July 31, 1953.
2/ Not shown to avoid disclosure of individual processors' operations.

SOURCE: Special survey by Bureau of Census and U. S. Dept. of Agr.

Table 4.--Soybeans, cottonseed and flaxseed: Number of mills, quantity processed, and oil yield, by method of extraction, United States, 1951-52 and 1952-53

Method of extraction	Number of mills			Quantity processed					Oil yield per bushel		
	1951-52	1952-53	Change	1951-52		1952-53		Change	1951-52	1952-53	Change
				1,000 bu.	Percent	1,000 bu.	Percent	Percent	Pounds	Pounds	Pounds
Soybeans											
Hydraulic press	31	19	- 12	3,480	1.4	2,082	0.9	- 0.5	8.39	8.11	-0.28
Screw press	92	79	- 13	60,440	24.9	31,096	13.3	-11.6	8.57	9.11	± .54
Direct solvent	70	76	± 6	178,922	73.7	200,702	85.8	±12.1	10.52	11.11	± .59
Total	193	174	- 19	242,842	100.0	233,880	100.0	---	10.00	10.82	± .82
Flaxseed											
Hydraulic press	1	1	0	1/	1/	1/	1/	1/	1/	1/	1/
Screw press	17	12	- 5	15,606	52.6	13,275	53.5	± 0.9	19.9	20.0	± 0.1
Direct solvent	2	2	0	1/	1/	1/	1/	1/	1/	1/	1/
Prepress solvent	3	3	0	9,077	30.6	1/	1/	1/	20.9	1/	1/
Total	23	18	- 5	29,664	100.0	2/24,809	100.0	---	20.3	20.1	- .2
Cottonseed											
				Tons	Percent	Tons	Percent		Oil yield per ton		
Hydraulic	240	205	- 35	3,111,679	56.8	2,509,280	46.0	-10.8	307	310	± 3
Screw press	75	80	± 5	1,728,397	31.6	1,798,366	32.9	± 1.3	329	327	- 2
Direct solvent	6	10	± 4	318,661	5.8	512,439	9.4	± 3.6	348	358	± 10
Prepress solvent	7	8	± 1	317,818	5.8	638,915	11.7	± 5.9	368	380	± 12
Total	328	303	- 25	5,476,555	100.0	5,459,000	100.0	---	320	328	± 8

1/ Not shown to avoid disclosure of individual processors' operations.
2/ The difference between total and screw press method primarily processed by prepress solvent.

SOURCE: Special survey by Bureau of Census and U. S. Dept. of Agr.

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